

United States Patent

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[54] **RELEASING TOOL FOR ONE-PIECE CABLE TIE**
16 Claims, 8 Drawing Figs.

[52] **U.S. Cl.**..... **81/3,**
24/16, 29/270

[51] **Int. Cl.**..... **B25b 27/00**

[50] **Field of Search**..... **81/3;**
29/235, 270, 278; 254/79

ABSTRACT: A molded, single-piece releasing tool comprises a body having a straight, narrow passage therethrough, a wedge and a hook respectively extending from one end thereof on opposite sides of the passage, and a handle extending from the other end thereof; the tool is used with an assembled one-piece cable tie in which one end of a strap is disposed through an opening in a frame at the other end thereof and is engaged with a toothed pawl pivotally mounted in the opening, the tool being operative to receive the strap in the passage with the hook engaging the frame and the wedge disposed in the opening between the strap and the pawl for disengagement thereof.

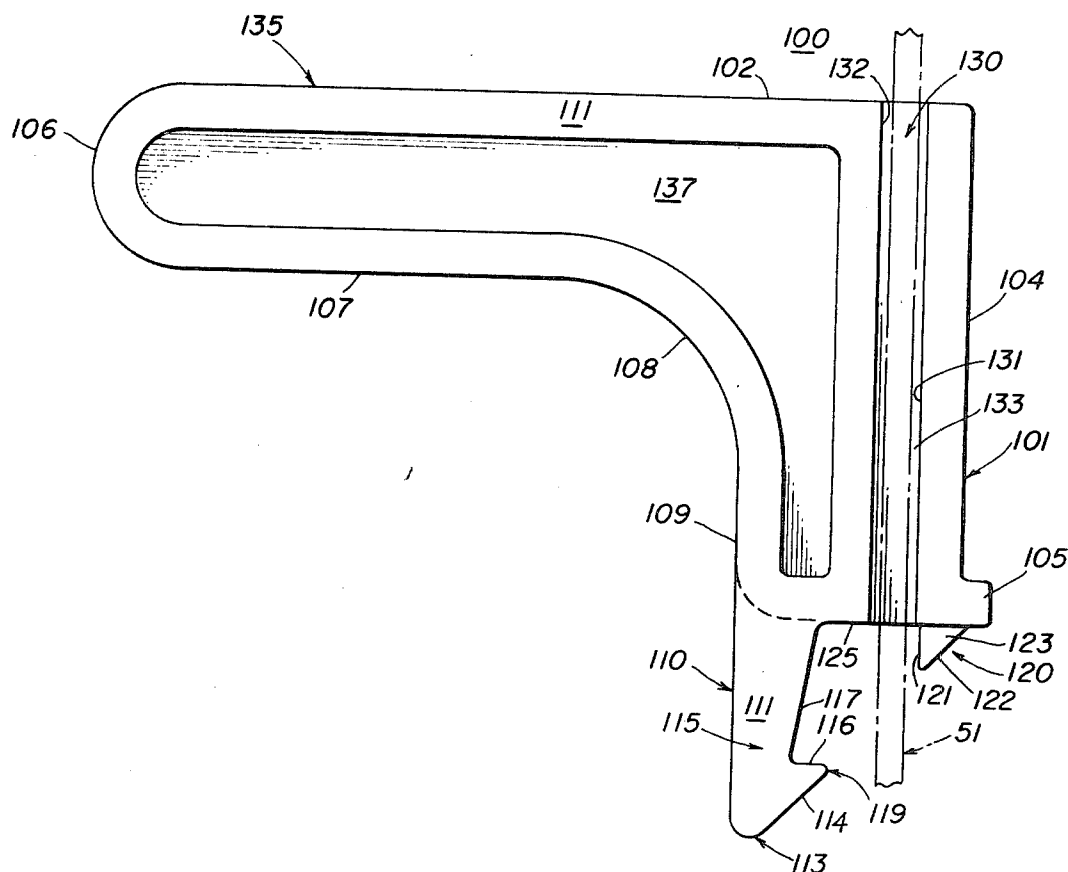


FIG. 1

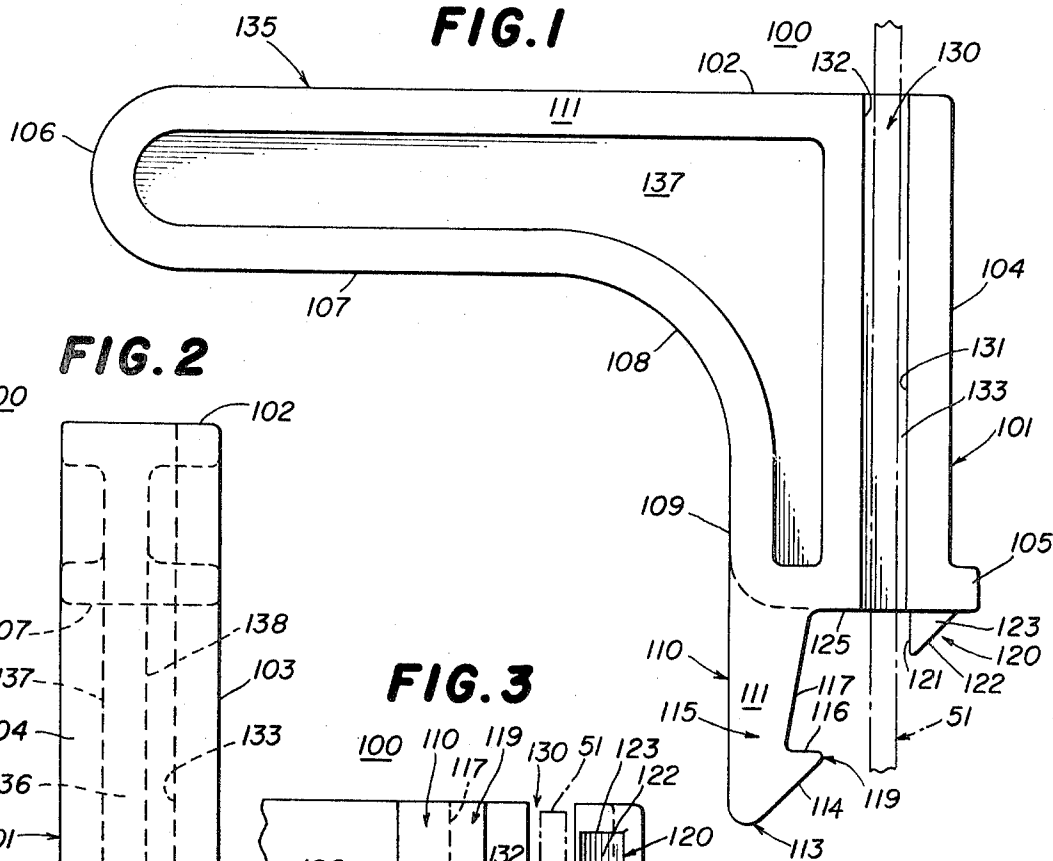


FIG. 2

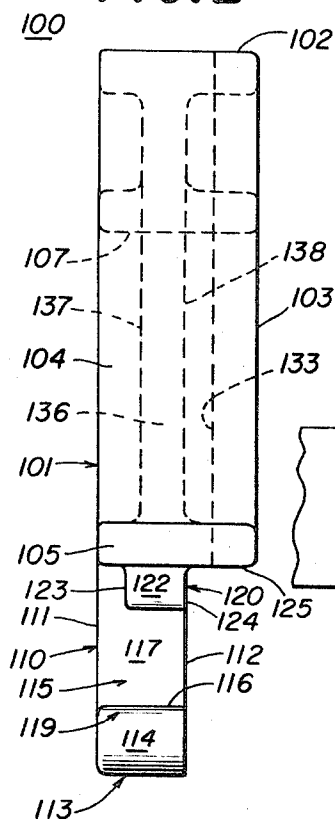


FIG. 3

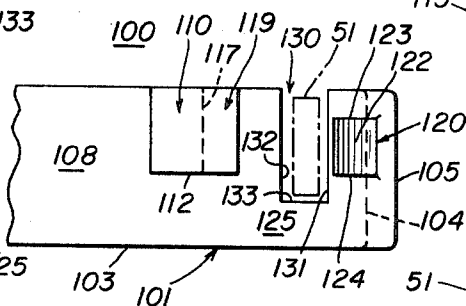


FIG. 5

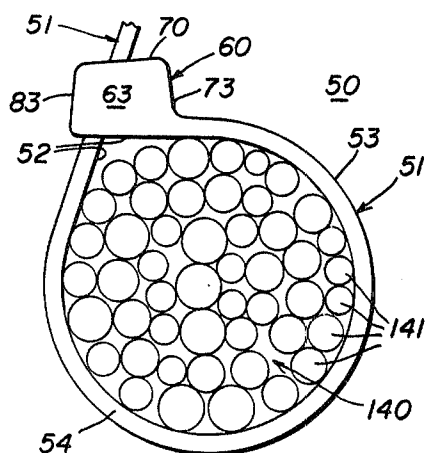
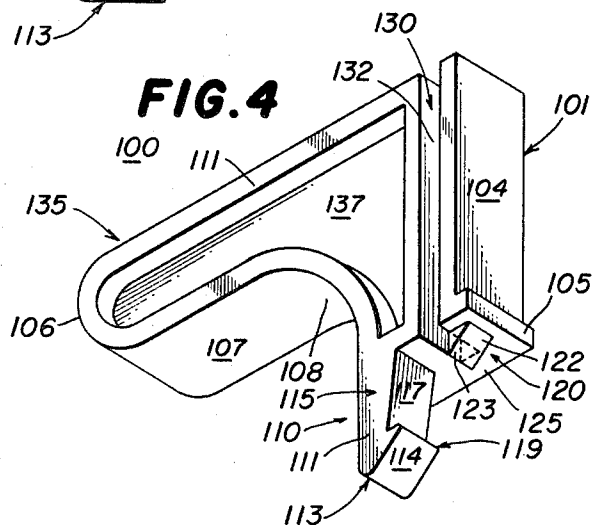


FIG. 4



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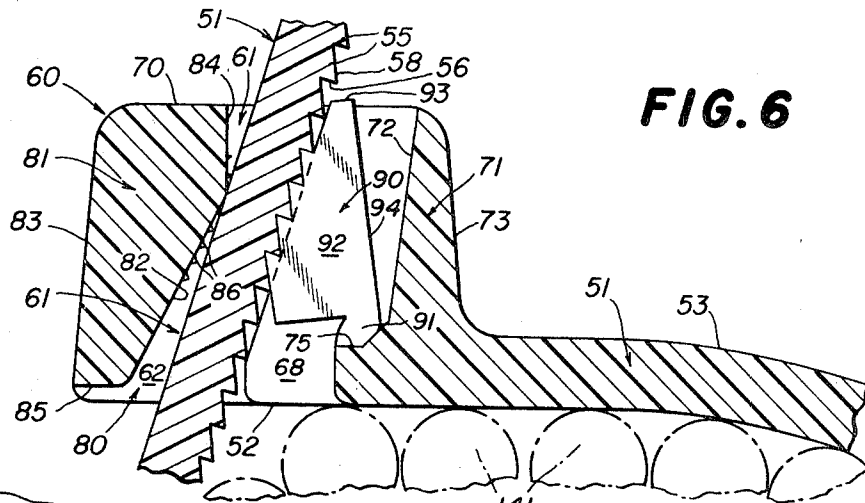


FIG. 6

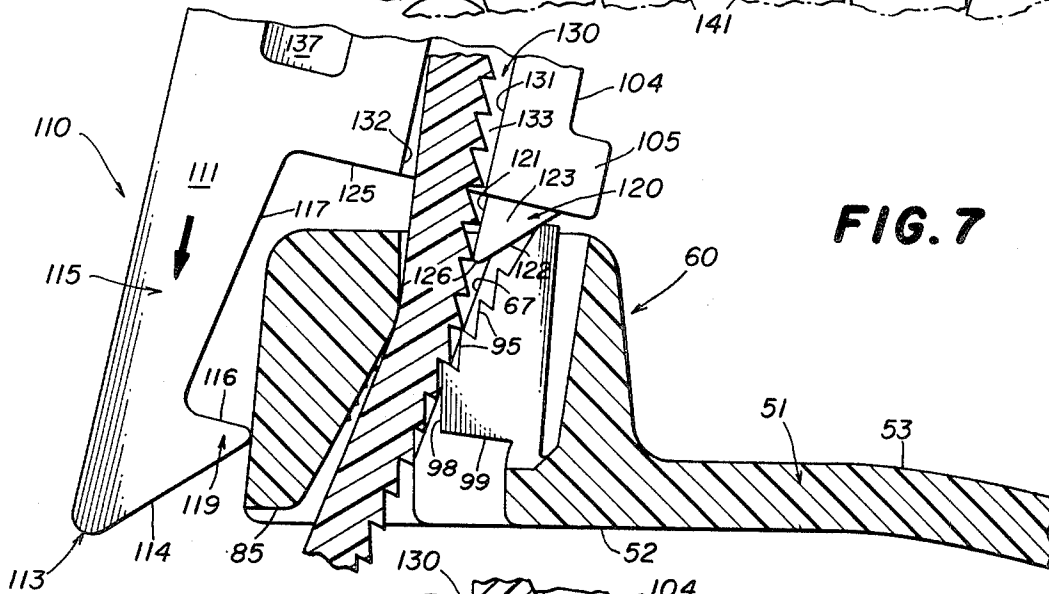


FIG. 7

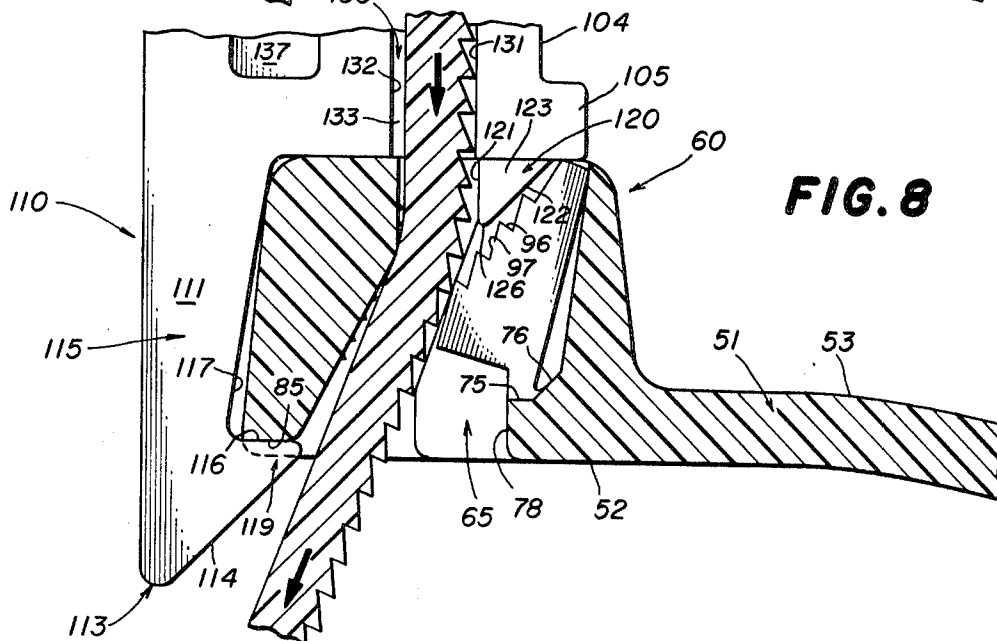


FIG. 8

RELEASING TOOL FOR ONE-PIECE CABLE TIE

This invention relates to releasing tools for releasing cable ties from the tensioned or assembled conditions thereof. More particularly, this invention relates to a releasing tool for a one-piece molded cable tie of the type set forth in the copending and commonly assigned U.S. application Ser. No. 821,875 of Caveney and Moody for "INTEGRAL CABLE TIE," filed May 5, 1969.

It is a general object of this invention to provide a releasing tool of the character described which is of simple and economical construction and is easily manipulated to release a one-piece cable tie from the assembled condition thereof.

An important object of this invention is to provide a releasing tool for releasing an integral one-piece cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally movable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening and is engaged with the pawl; the releasing tool comprising a body, the body having a passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of the body adjacent to one side of the passage, a retaining hook extending from the one end of the body on the other side of the passage and being engageable with the frame adjacent to the entry surface thereof, the tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in the passage and the body overlies and contacts the exit surface and the hook engages the frame adjacent to the entry surface thereof and the wedge is disposed in the opening between the pawl and the strap, the wedge urging the pawl into the disengaged condition thereof when the tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.

In connection with the foregoing object is another object of this invention to provide a releasing tool of the character described, in which the body has a straight narrow passage therethrough substantially rectangular in cross section, and in which the wedge has a first flat camming surface parallel to and substantially coplanar with the one side of the passage and a second flat camming surface intersecting the first camming surface at an acute angle thereto and extending outwardly therefrom in a direction away from the longitudinal axis of the passage.

In connection with the foregoing objects, yet another object of this invention is to provide a releasing tool of the character described in which the frame of the cable tie has a guide surface adjacent to the entry surface and extending from the opening to the exterior of the frame, and in which the retaining hook includes an elongated arm and a prong, the arm extending from the one end of the body substantially normal thereto on the other side of the passage, the prong being integral with the outer end of the arm and extending inwardly therefrom toward the wedge and being engageable with the guide surface of the frame.

In connection with the foregoing objects, it is yet another object of this invention to provide a releasing tool of the character described in which the assembled condition of the cable tie, the strap is disposed through the opening at an acute angle to the longitudinal axis of the strap as molded, and in which the longitudinal axis of the passage and the portion of the strap disposed therein are disposed substantially normal to the longitudinal axis of the strap as molded when the tool is in the operative position thereof, thereby to facilitate the insertion of the wedge between the strap and the pawl.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of the releasing tool according to the invention showing the manner in which the strap is disposed in the passage;

FIG. 2 is a side elevational view of the releasing tool shown in FIG. 1 as viewed from the right side thereof;

FIG. 3 is a fragmentary bottom plan view of the releasing tool as shown in FIG. 1;

FIG. 4 is a reduced perspective view of the releasing tool of FIG. 1;

FIG. 5 is a fragmentary view of a single-piece cable tie for use in connection with the releasing tool according to the invention and shown in its assembled condition about a bundle of wires;

FIG. 6 is an enlarged fragmentary view in vertical section of the frame portion of the cable tie shown in FIG. 5;

FIG. 7 is a fragmentary view of the frame portion of the cable tie as shown in FIG. 6 and also showing a portion of the releasing tool with the strap disposed in the passage thereof;

FIG. 8 is a fragmentary view of the cable tie and releasing tool shown in FIG. 7 with the releasing tool in the operative position thereof.

Referring now to FIGS. 5 to 8 of the drawings, there is shown an integral one-piece cable tie generally designated by the numeral 50, of the type with which the releasing tool of the present invention is designed to be used. The cable tie 50 includes, generally, a strap 51 carrying on one end thereof a frame or head 60 having a strap-receiving opening or throat 80 therethrough in which is disposed a pawl 90. The cable tie 50 is typically used to bind a bundle 140 formed of a plurality of wires 141 and, accordingly, the cable tie 50 has been illustrated in this end use in FIG. 5. However, it will be appreciated that the cable tie 50 can be advantageously used to bind other objects in a like manner.

Detailed descriptions of the construction, operation and use of several preferred embodiments of such cable ties may be found in the copending and commonly assigned U.S. application Ser. No. 821,875 of Caveney and Moody for "INTEGRAL CABLE TIE," filed May 5, 1969.

The strap 51 includes a pair of longitudinally extending strap sides 54 which extend the length of the strap 51, and an inner or bundle-engaging surface 52 and an outer surface 53. Disposed in the surface 52 is a row of teeth 55, the teeth 55 being disposed in a recessed position with respect to the surface 52 and extending laterally of the strap 51 and having a length slightly less than the width of the surface 52, whereby to be confined completely within the body of the strap 51. As illustrated, each of the teeth 55 has a shorter side 56 disposed substantially normal to the adjacent strap surface 52 and a longer or inclined side 57.

The frame 60 is integral with the strap 51 and comprises a pair of sidewalls or members 61, a rear wall or member 71 and a front wall or member 81. The sidewalls 61 are laterally spaced apart and include inner surfaces 62 that extend the full height of the frame 60 and are disposed essentially parallel to one another, the inner surfaces 62 more specifically extending from the inner surface 52 which serves as an entry surface for the frame 60 to an exit surface 70 on the top of the frame 60 as viewed in FIGS. 6 to 8. The inner surfaces 62 further are spaced apart a distance greater than the distance between the strap sides 54, whereby the strap 51 may be received between the inner surfaces 62, all as will be explained more fully hereinafter. Each of the sidewalls 61 further includes an outer surface 63 that extends from the entry surface 52 to the exit surface 70.

Provided on each of the sidewalls 61 is a rail generally designated by the numeral 65, the rails 65 extending laterally inwardly toward one another and having inclined surfaces 67 disposed essentially normal to the inner surfaces 62 and having inner surfaces 68 facing one another and disposed essen-

tially parallel to the inner surfaces 62. The rails 65 serve to guide the strap 61 along a predetermined path through the frame 60, all as is explained more fully in the aforementioned copending application, Ser. No. 821,875.

The rear wall or end wall 71 includes an inner surface 72 and an outer surface 73, the inner surface 72 diverging downwardly away from the outer surface 73 from the exit surface 70 to the entry surface 52, whereby the rear wall 71 is thicker at the bottom thereof than at the top thereof, all as is illustrated in FIGS. 6 to 8. It further is pointed out that the strap 51 is joined to the frame 60 at the lower and thicker portion of the end wall 71.

The front wall or abutment wall 81 has an inner surface which includes a lower inclined strap-bearing surface 82, an upper relieved surface 84, both of which surfaces are spaced from the rear wall 71 in the direction opposite to the strap 51. The inner surface 82 is inclined at an angle of about 66° from the entry surface 52 toward the exit surface 70 with respect to the longitudinal axis of the strap 51 as molded, the abutment wall 81 and the pawl 90 cooperating to provide therebetween a strap-receiving opening 80 that has the longitudinal axis thereof generally parallel to the strap-bearing surface 82. The relieved surface 84 is disposed essentially normal to the longitudinal axis of the strap 51 as molded and is spaced from the pawl 90 in the direction away from the strap 51 and is shaped to facilitate better cutoff of the cable tie 50. More specifically, the surface 84 is in the form of a plane disposed substantially normal to the longitudinal axis of the strap 51 as molded, but may be inclined upwardly and away from the strap 51, whereby the surface 84 is relieved at least to a plane substantially normal to the longitudinal axis of the strap 51 as molded and spaced from the pawl 90. The front wall 81 also has an outer surface 83 which extends downwardly from the exit surface 70 and terminates a short distance away from the entry surface 52 and joins thereat a guide surface 85 which connects the inner surface 82 and the outer surface 83. More specifically, the guide surface 85 is spaced away from the entry surface 52 and together with the inner surfaces 62 of the sidewalls 61 defines a strap-receiving channel in the frame 60. The channel thus provided in the frame 60 and beneath the front wall 81 permits the frame 60 to lie more closely against the associated bundle 140, when the parts are in the tensioned condition, as illustrated in FIG. 5.

There is provided on the strap-bearing surface 82 a plurality of transversely arranged and longitudinally spaced-apart strap-gripping projections 86. The projections 86 have a length slightly less than the width of the strap 51 and are urged into the adjacent surface 53 of the strap 51 in the tightening of the cable tie 50 about the associated bundle 140.

Extending between the rails 65 adjacent to the lower portion of the end wall 71 is a ledge 75, the ledge 75 being essentially rectangular and directed toward the front wall 81 and disposed substantially parallel to the entry surface 52 and the longitudinal axis of the strap 51 as molded. The transverse edge of the ledge 75 disposed toward the strap 51 joins an upwardly inclined surface 76 that connects with the inner surface 72 on the rear wall 71. A surface 78 interconnects the entry surface 52 and the edge of the central portion of the ledge 75 disposed toward the front wall 81.

Mounted within the strap-receiving opening 80 in the frame 60 is the pawl 90, the pawl 90 being connected to and mounted on the ledge 75 by means of a rigid noncollapsible hinge 91, the hinge 91 being essentially rectangular in cross section. The pawl 90 has a pair of side surfaces 92 disposed substantially parallel to each other, the side surfaces 92 being spaced apart a distance slightly less than the transverse dimensions of the teeth 55 on the strap 51. The pawl 90 also has a top surface 93, and a rear surface 94 disposed toward the inner surface 72. A set of teeth 95 is provided on the surface of the pawl 90 disposed toward the front wall 81, the teeth 95 each having a shorter side 96 and a longer inclined side 97. The crests of the teeth 95 all lie in a common plane which is essentially parallel to the opposed inner surface 82 on the

front wall 81 as molded; and the roots of the teeth 95 on the pawl 90 also lie in a common plane that is essentially parallel to the opposed inner surface 82 on the front wall 81 as molded. Furthermore, the crest-to-crest distance of the pawl teeth 95 is slightly less than the crest-to-crest distance of the strap teeth 55, whereby to insure that all of the teeth 95 on the pawl 90 engage teeth 55 on the strap 51, all as is explained more fully in the aforementioned copending application Ser. No. 821,875. The pawl 90 further has a lower front surface 98 that extends downwardly and joins a bottom surface 99 which connects with the hinge 91, whereby to define the portion of the pawl 90 disposed forwardly of the hinge 91. The pawl 90 is pivotally movable between a normal or intermediate engage position, shown in FIG. 7, wherein the lowermost one of the teeth 95 extends beyond the inclined surfaces 67 of the rails 65 for engagement with the teeth 55 of the strap 51, a fully engaged position, shown in FIG. 6, wherein all of the teeth 95 extend beyond the inclined surfaces 67 of the rails 65 and are engaged with the strap teeth 55, and a disengaged position, shown in FIG. 8, wherein the upper end of the pawl 90 contacts the inner surface 72 of the end wall 71 and none of the teeth 95 extend beyond the rail surfaces 67.

It is an important feature of the cable tie 50 that in the assembled condition thereof as shown in FIG. 5 the strap 51 may be moved in only one direction through the opening 80 in the frame 6 viz. upwardly as viewed in FIG. 5. Because of the ratchet action between the teeth 55 of the strap 51 and the teeth 95 of the pawl 90, any attempt to withdraw the strap 51 from the frame 60 in the strap-loosening direction (downwardly as viewed in FIG. 5) will simply result in further tightening of the cable tie 50. Once assembled, it is practically impossible to release the cable tie 50 from its assembled condition by hand. It is to make such release possible that the releasing tool of the present invention is provided.

Referring to FIGS. 1—4 of the drawing, a releasing tool, generally designated by the numeral 100 is shown, the releasing tool 100 preferably being formed integrally from a single piece of material. The releasing tool 100 has a body portion, generally designated by the numeral 101, which has a flat, planar top surface 102, a flat planar rear surface 103 disposed substantially normal to the top surface 102 and a flat, planar front surface 111 parallel to the rear surface 103. A flat, planar side surface 104 is normal to and interconnects the edges of the top surface 102, the rear surface 103 and the front surface 111 at the right-hand side of the releasing tool 100 as viewed in FIG. 1. At the bottom end of the side surface 104 as viewed in FIG. 1 is formed a flange 105, generally rectangular in cross section and extending outwardly from the side surface 104 substantially normal thereto. The top surface 102, at the other end thereof, connects with an arcuate end surface 106 which extends downwardly from the top surface 102 and in turn connects with a bottom surface 107, the bottom surface 107 being disposed substantially parallel to the top surface 102. The inner end of the bottom surface 107 connects with an arcuate connecting surface 108 which in turn connects with a downwardly extending side surface 109, the side surface 109 being disposed substantially parallel to the side surface 104 and extending substantially beyond the flange 105.

Extending from the bottom end of the body 101 as viewed in FIG. 1 is a retaining hook, generally designated by the numeral 110, and comprising an elongated arm, generally designated by the numeral 115, and a prong, generally designated by the numeral 119. The side surface 109 forms one side of the elongated arm 115 of the hook 110, the surface 109 terminating at the lower end thereof in an arcuate tip or end surface, generally designated by the numeral 113. Extending inwardly and upwardly from the tip 113 toward the side surface 104 is a flat planar inclined surface 114, the surface 114 joining a flat ledge surface 116 at the upper end thereof, the ledge surface 116 being disposed substantially normal to the top surface 102 and extending outwardly toward the side surface 109. The ledge surface 116 connects at the outer end

thereof with an upwardly extending surface 117 which forms the inner side surface of the arm 115 of hook 110. The inclined surface 114 cooperates with the ledge surface 116 to define the prong 119 of the hook 110, the prong surfaces 114 and 116 and the side surfaces 109 and 117 being joined at the opposite ends thereof by the front surface 111 and a rear surface 112 recessed from the rear surface 103.

Extending downwardly from the body 101 as viewed in FIG. 1 adjacent to the flange 105 is a wedge, generally designated by the numeral 120. The wedge 120 includes a first camming surface 121 parallel to the side surface 104 and disposed inwardly thereof, the first camming surface 121 extending outwardly from the body 101 a relatively short distance substantially less than the length of the hook 110. A second camming surface 122 is disposed at an angle to the first camming surface 121 and extends upwardly and outwardly therefrom toward the flange 105, the camming surfaces 121 and 122 joining at the lower ends thereof to form a tip 126 of the wedge 120. The first and second camming surfaces 121 and 122 are respectively joined by a flat planar front surface 123, recessed from the front surface 111, and a flat planar rear surface 124, recessed from the rear surface 102, the surfaces 123 and 124 being substantially parallel to each other and normal to the camming surfaces 121 and 122.

The hook 110 and the wedge 120 are each integral at the upper ends thereof, as viewed in FIG. 1, with a flat bottom surface 125 of the body 101 substantially parallel to the top surface 102. Disposed in the body 101 between the hook 110 and the wedge 120 is an elongated, straight, slot or passage 130 extending the entire length of the body 101 from the bottom surface 125 to the top surface 102, the passage 130 having a generally rectangular sidewall 131 parallel to the side surface 104 and a generally rectangular sidewall 132, the sidewalls 131 and 132 being spaced apart a distance slightly greater than the thickness of the strap 51 and being jointed at the rear ends thereof by a flat rear wall 133 parallel to the rear surface 103. The sidewall 131 of the passage 130 is preferably substantially in alignment with the first camming surface 121 of the wedge 120 to guide the strap 51 and facilitate operation of the tool as will be described more fully hereinafter.

The outer ends of the top surface 102 and the bottom surface 107 and the arcuate end surface 106 cooperate to define a handle, generally designated by the numeral 135, which extends outwardly of the body 101 to the left as viewed in FIG. 1 substantially normal to the side surfaces 104 and 109. The front surface 111 and the rear surface 103 of the handle 135 are recessed to define an inner web or wall 136 having a front surface 137 and a rear surface 138 each parallel to the surfaces 103 and 111. Preferably, the shape of the recessed portion generally conforms to the outline of the body 101 and is spaced at the inner end thereof a short distance from the passage 130 and extends downwardly to a point adjacent to the upper end of the hook 110. The purpose of the recess portions of the handle 135 is to provide finger-gripping surfaces to facilitate the gripping and operation of the tool 100.

Referring now to FIG. 8 of the drawings, the operation of the releasing tool 100 will be described. As shown in FIG. 6 when the cable tie 50 is in the assembled condition thereof, the strap 51 extends upwardly through the frame 60 and beyond the exit surface 70 thereof, the strap teeth 55 engaging the pawl teeth 95 and pivoting the pawl forwardly to a position where the crests of the teeth 95 lie in a plane substantially parallel to the strap-bearing surface 82. It will be noted that in this position, the strap 51 cannot be moved in a strap-loosening direction (downwardly as viewed in FIG. 6). Even if the upper portion of the strap 51 extending beyond the exit surface 70 is bent forwardly toward the relieved surface 84 of the frame 60 so as to disengage the upper ones of the teeth 95, the strap 51 is still incapable of movement in the strap-loosening direction because the lower ones of the teeth 55 will remain in engagement with the lower ones of the teeth 95 which are disposed below the upper end of the strap bearing surface 82. In order to disengage these lower teeth, it is necessary to move

the pawl 90 rearwardly toward the inner surface 72 of the end wall 71, which movement is extremely difficult with the use of only the unaided hand.

In utilizing the releasing tool 100 the portion of the strap 51 extending beyond the exit surface 70 is first inserted in the slot or passage 130 formed in the body 101 of the tool 100. The tool 100 is then slid downwardly along the strap 51 to a preliminary position immediately overlying frame 60 of the cable tie 50 as illustrated in FIG. 7. In this preliminary position, the prong 119 of the hook 110 lies against the outer surface 83 of the abutment wall 81 and the tip 126 of the wedge 120 extends into the opening 80 adjacent to the exit surface 70 with the camming surface 121 in engagement with the row of teeth 55 on the strap 51. In order to engage the prong 119 of the hook 110 with the outer surface 83 of the wall 81 it is necessary to pivot the releasing tool in a counterclockwise direction as viewed in FIG. 8, the portion of the strap 51 extending beyond the exit surface 70 being carried by the walls of the passage 130 in a counterclockwise direction, thereby disengaging the upper ones of the row of teeth 55 from the upper ones of the set of teeth 95 and permitting the insertion of the tip 126 of the wedge 120 therebetween. Continued counterclockwise rotation of the releasing tool 100 will further bend the portion of the strap extending beyond the exit surface 70 toward the relieved surface 84, of the abutment wall 81, the prong 119 of the hook 110 simultaneously sliding downwardly along the outer surface 83 in the direction indicated by the heavy arrow in FIG. 7. By reason of the resilient nature of the hook 119, the arm 115 thereof is bent slightly outwardly by the outer surface 83 as the releasing tool 100 is moved counterclockwise. When the releasing tool finally arrives at the operative position thereof as shown in FIG. 8, the portion of the strap 51 extending beyond the exit surface 70 is disposed substantially parallel to the relieved surface 84 of the abutment wall 81 and the prong 119 of the hook 110 snaps into engagement with the guide surface 85 along the bottom of the abutment wall 81 for securely locking the releasing tool 100 in this operative position.

It will be noted that in this operative position, the camming surface 121 of the wedge 120 is disposed substantially parallel to the relieved surface 184 of the abutment wall 81 and cooperates therewith to form lower extension of the channel or passage 130 which is disposed in registration therewith immediately thereabove. In this position, the bottom surface 125 of the tool 100 overlies and contacts the exit surface 70 of the frame 60, whereby the entire length of the wedge 120 is inserted into the opening 80 between the strap 51 and the pawl 90, whereby the second camming surface 122 of the wedge 20 serves to urge the pawl 90 into the disengaged position thereof wherein the rear surface 94 thereof contacts the inner surface 72 of the end wall 71. This movement of the pawl 90 into its disengaged position serves to move each of the teeth in the set of teeth 95 beneath the plane of the inclined surfaces 67 of the guides 65. Thus, since the row of teeth 55 ride upon and do not extend beneath the inclined surfaces 67, the set of teeth 95 will be completely out of engagement with the row of teeth 55, whereby the strap 51 may be withdrawn from the head 60 in the strap-loosening direction as indicated by the heavy arrows in FIG. 8.

It will be noted, that the bottom surface 125 of the body 101, the inner side surface 117 of the hook arm 115 and the ledge surface 116 of the prong 119 are shaped complementary to the outer surface 83 and the guide surface 85 respectively of the abutment wall 81, whereby the releasing tool 100 in the operative position thereof lies closely against the frame 60, to facilitate firmly latching the releasing tool 100 into its operative position. As a result, the strap 51 may be removed from the head or frame 60 by pulling upwardly on the tool 100, whereby the frame 60 is carried upwardly along the strap 51 toward the free end thereof. Alternatively, the strap 51 may be pulled downwardly in the direction of the arrows in FIG. 8, if it is possible to grip the portion of the strap 51 lying about the cable bundle 140.

While the releasing tool 100 may be formed from any number of suitable materials, plastic materials are found to be most advantageous for this purpose, and preferably the tool 100 is formed of nylon. The integral, one-piece construction of the tool 100 permits it to be formed by suitable molding processes or, alternatively, by machining a solid block of material. The preferred materials and methods of construction for the cable tie 50 are set forth in detail in the aforementioned application Ser. No. 821,875.

It will be understood, from an examination of the aforementioned copending application, that there are a number of alternative embodiments of the cable tie 50, e.g., the exit surface may be sloped downwardly from the end wall 71 toward the abutment wall 81. The releasing tool 100 of the present invention may be readily adapted to use with other such alternative embodiments of the cable tie 50 by shaping the surfaces 125, 117 and 116 thereof accordingly, so as to conform to the corresponding surfaces on the cable tie frame 60. Furthermore, while the handle 135 has been disposed outwardly from the side surface 109, it will of course be understood that it may also be oriented in other positions. For example, the handle might extend outwardly from the sidewall 104 or outwardly from the rear wall 103 of the body 101 and may take any number of shapes other than the one pictured in FIGS. 1 to 4.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various other modifications may be made therein, and it is intended to cover in the appended claims of such modifications as fall within the true spirit and scope of the invention.

What we claim is:

1. A releasing tool for releasing an integral one-piece cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally moveable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening and is engaged with the pawl; said releasing tool comprising a body, said body having a passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of said body adjacent to one side of said passage, a retaining hook extending from said one end of said body on the other side of said passage and being engageable with the frame adjacent to the entry surface thereof, said tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in said passage and said body overlies and contacts the exit surface and said hook engages the frame adjacent to the entry surface thereof and said wedge is disposed in the opening between the pawl and the strap, said wedge urging the pawl into the disengaged condition thereof when said tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.

2. The releasing tool set forth in claim 1, wherein the end of said body adjacent to said wedge and said hook is shaped complementary to the adjacent portion of the frame when said tool is in the operative position thereof.

3. The releasing tool set forth in claim 1, and further including, a handle integral with and extending outwardly from said body adjacent to the other end thereof to facilitate the gripping and operation of said tool.

4. The releasing tool set forth in claim 1, and further including a handle integral with said body adjacent to the other end thereof and extending outwardly from said other side of said passage, said handle having finger recesses on the opposite

sides thereof to facilitate the gripping and operation of said tool.

5. The releasing tool set forth in claim 1, wherein said tool is of an integral, molded, single-piece construction.

6. A releasing tool for releasing an integral one-piece cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally movable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening and is engaged with the pawl; said releasing tool comprising a body, said body having a straight passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of said body adjacent to one side of said passage, said wedge having a first flat camming surface parallel to and substantially in alignment with said one side of said passage and a second flat camming surface intersecting said first camming surface at an acute angle thereto and extending outwardly therefrom in a direction away from the longitudinal axis of said passage, and a retaining hook extending from said one end of said body on the other side of said passage and being engageable with the frame adjacent to the entry surface thereof, said tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in said passage and said body overlies and contacts the exit surface of the frame and said hook engages the frame adjacent to the entry surface thereof and said wedge is disposed in the opening of the frame between the pawl and the strap, said first camming surface engaging the row of teeth on the strap and said second camming surface engaging the set of teeth on the pawl when said tool is in the operative position thereof, whereby said second camming surface urges the pawl into the disengaged position thereof when said tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.

7. The releasing tool set forth in claim 6, wherein said first camming surface extends outwardly from said body a distance substantially less than the distance between the entry and exit surfaces of the frame.

8. The releasing tool set forth in claim 6, wherein said wedge is integral with said body.

9. The releasing tool set forth in claim 6, wherein said first and second camming surfaces have widths respectively equal to each other and less than the width of the associated strap.

10. The releasing tool set forth in claim 6, wherein said passage comprises a slot formed in one side of said body.

11. The releasing tool set forth in claim 6, wherein said passage is substantially rectangular in cross section and is shaped complementary to the strap.

12. A releasing tool for releasing an integral one-piece cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, the frame having a guide surface adjacent to the entry surface and extending from the opening to the exterior of the frame, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally movable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening and is engaged with the pawl, said releasing tool comprising a body, said body having a passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated

frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of said body adjacent to one side of said passage, and a retaining hook including an elongated arm and a prong thereon extending inwardly therefrom, said arm extending from said one end of said body substantially normal thereto on the other side of said passage, said prong being integral with the outer end of said arm and extending inwardly therefrom toward said wedge and being engageable with the guide surface of the frame, said tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in said passage and said body overlies and contacts the exit surface and said prong engages the guide surface of the frame and said wedge is disposed in the opening between the pawl and the strap, said wedge urging the pawl into the disengaged condition thereof when said tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.

13. The releasing tool set forth in claim 12, wherein said retaining hook has a width less than the width of the associated strap and greater than the width of said wedge.

14. The releasing tool set forth in claim 12, wherein said hook is resiliently mounted on said body and is shaped complementary to the adjacent portion of the associated frame when said tool is in the operative position thereof whereby said hook latches into engagement with the guide surface of the frame when said tool is in the operative position thereof.

15. A releasing tool for releasing an integral one-piece molded cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally movable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening at an acute angle to the longitudinal axis of the strap as molded and is engaged with the pawl; said releasing tool comprising a body, said body having a passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of said body adjacent to one side of said passage, a retaining hook extending from said one end of said body on the other side of said passage and being engageable with the frame adjacent to the entry surface thereof, said tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in said passage and said body overlies and contacts the exit surface and said hook engages the frame adjacent to the entry surface thereof and said wedge is disposed in the opening between the pawl and the strap, the longitudinal axis of said passage and the portion of the strap disposed therein being disposed substantially normal to the longitudinal axis of the strap as molded when said tool is

in the operative position thereof to facilitate insertion of said wedge between the strap and the pawl, said wedge urging the pawl into the disengaged condition thereof when said tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.

16. A releasing tool for releasing an integral one-piece molded cable tie including an elongated flexible strap having a row of teeth thereon, a frame integral with one end of the strap and having an entry surface and an exit surface and a strap-receiving opening therethrough, the frame having a guide surface adjacent to the entry surface and extending from the opening to the exterior of the frame, a pawl mounted within the opening in the frame and having a set of teeth shaped complementary to the row of teeth and being pivotally movable between an engaged position in engagement with the row of teeth and a disengaged position out of engagement with the row of teeth, the cable tie having an assembled condition wherein the strap is disposed through the opening at an acute angle to the longitudinal axis of the strap as molded and is engaged with the pawl; said releasing tool comprising a body, said body having a straight passage therethrough for accommodating the portion of the associated strap extending beyond the exit surface of the associated frame when the associated cable tie is in the assembled condition thereof, a wedge extending from one end of said body adjacent to one side of said passage, said wedge having a first flat camming surface substantially parallel to and substantially in alignment with the one side of said passage and a second flat camming surface intersecting said first camming surface at an acute angle thereto and extending outwardly therefrom in a direction away from the longitudinal axis of said passage, a retaining hook including an elongated arm and a prong thereon extending inwardly therefrom, said arm extending from said one end of said body substantially normal thereto on the other side of said passage, said prong being integral with the outer end of said arm and extending inwardly therefrom toward said wedge and being engageable with the guide surface of the frame, said tool having an operative position wherein the portion of the strap extending beyond the exit surface is disposed in said passage and said body overlies and contacts the exit surface of the frame and said prong engages the guide surface of the frame and said wedge is disposed in the opening of the frame between the pawl and the strap, the longitudinal axis of said passage and the portion of the strap disposed therein being disposed substantially normal to the longitudinal axis of the strap as molded when said tool is in the operative position thereof to facilitate insertion of said wedge between the pawl and the strap, said first camming surface engaging the row of teeth on the strap and said second camming surface engaging the set of teeth on the pawl when said tool is in the operative position thereof, whereby said second camming surface urges the pawl into the disengaged position thereof when said tool is in the operative position thereof to disengage the set of teeth on the pawl from the row of teeth on the strap, thereby to release the strap so that it may be readily withdrawn from the frame.